

CLAIMS

1 1. A magnetic head including a read head element, comprising:
2 a pinned magnetic layer;
3 a free magnetic layer having a central portion thereof having a free magnetization
4 therewithin;
5 a magnetic bias layer, including a central portion thereof that is disposed across said
6 central portion of said free magnetic layer;
7 said central portion of said bias layer being comprised of a material having an
8 approximately zero magnetic moment;
9 a barrier layer being disposed across said central portion of said bias layer.

1 2. A magnetic head as described in claim 1 wherein said central portion of said bias layer is
2 comprised of an oxidized material, and said barrier layer is comprised of a material that is a
3 barrier to oxygen diffusion from said central portion of said bias layer.

1 3. A magnetic head as described in claim 2, further including a thin spacer layer that is
2 disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer
3 layer and said barrier layer is disposed upon said bias layer.

1 4. A magnetic head as described in claim 3 wherein said barrier layer is comprised of a
2 material that has low electrical conductivity.

1 5. A magnetic head as described in claim 4 wherein said barrier layer is comprised of Ru or
2 Rh.

1 6. A magnetic head as described in claim 5 wherein said barrier layer is comprised of Ru
2 having a thickness of from approximately 5 Å to approximately 40 Å.

1 7. A magnetic head as described in claim 6 wherein said barrier layer has a thickness of
2 approximately 20 Å.

1 8. A magnetic head as described in claim 3 wherein said thin spacer layer is comprised of a
2 material that is a barrier to oxygen diffusion.

1 9. A magnetic head as described in claim 8 wherein said thin spacer layer is comprised of
2 Ru.

1 10. A hard disk drive including a magnetic head including a read head element, comprising:
2 a pinned magnetic layer;
3 a free magnetic layer having a central portion thereof having a free magnetization
4 therewithin;
5 a magnetic bias layer, including a central portion thereof that is disposed across said
6 central portion of said free magnetic layer;
7 said central portion of said bias layer being comprised of a material having an
8 approximately zero magnetic moment;
9 a barrier layer being disposed across said central portion of said bias layer.

1 11. A magnetic head as described in claim 10 wherein said central portion of said bias layer
2 is comprised of an oxidized material, and said barrier layer is comprised of a material that is a
3 barrier to oxygen diffusion from said central portion of said bias layer.

1 12. A magnetic head as described in claim 11, further including a thin spacer layer that is
2 disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer
3 layer and said barrier layer is deposited upon said bias layer.

1 13. A magnetic head as described in claim 12 wherein said barrier layer is comprised of a
2 material that has low electrical conductivity.

1 14. A magnetic head as described in claim 13 wherein said barrier layer is comprised of Ru
2 or Rh.

1 15. A magnetic head as described in claim 14 wherein said barrier layer is comprised of Ru
2 having a thickness of from approximately 5 Å to approximately 40 Å.

1 16. A magnetic head as described in claim 15 wherein said barrier layer has a thickness of
2 approximately 20 Å.

1 17. A magnetic head as described in claim 12 wherein said thin spacer layer is comprised of a
2 material that is a barrier to oxygen diffusion.

1 18. A magnetic head as described in claim 17 wherein said thin spacer layer is comprised of
2 Ru.

1 19. A method for fabricating a magnetic head, comprising:
2 fabricating a free magnetic layer;
3 fabricating a magnetic bias layer across said free magnetic layer;
4 oxidizing a central portion of said bias layer;
5 depositing an oxygen diffusion barrier layer upon said oxidized central portion of said
6 bias layer.

1 20 A method for fabricating a magnetic head as described in claim 19 wherein said barrier
2 layer is comprised of Ru or Rh.

1 21. A method for fabricating a magnetic head as described in claim 20 wherein said barrier
2 layer is comprised of Ru and has a thickness of from approximately 5 Å to approximately 40 Å.

1 22. A method for fabricating a magnetic head as described in claim 21 wherein said barrier
2 layer is formed with a thickness of approximately 20 Å.